



## Calibration

# Temperature dry-well calibrator Premium version Models CTD9350-165, CTD9350-700

WIKA data sheet CT 41.39

### Applications

- Bio and pharmaceutical industries
- Food industry
- Power plants and plant construction
- Measurement and control laboratories in the chemical industry
- Demanding calibrations in production and laboratory

### Special features

- Easy operation via intuitive, user-friendly menus
- Large, easy-to-read touchscreen
- Short response times due to optimised control
- Improved accuracy due to homogeneous dry-well temperature
- Creation of calibration tasks incl. preparation of a certificate



**Model CTD9350-700-M with integrated measuring instrument**

### Description

#### Range of applications

Whether in laboratories, workshops or on-site, the CTD9350 series of temperature dry-well calibrators can meet any calibration requirement. All instruments can be fitted, with an integrated measuring instrument. This enables the measurement of resistances, thermoelectric voltages and also current signals (from thermometers with a 0/4 ... 20 mA transmitter) and their direct display in °C.

#### Two models from -35 ... +700 °C [-31 ... +1,292 °F]

The temperature dry-well calibrators are matched to two temperature ranges. The CTD9350-165 to a range of -35 ... +165 °C [-31 ... +329 °F], which is important for the biotechnology, pharmaceutical and food industries.

Above 40 °C [104 °F] the CTD9350-700, with a limit temperature of 700 °C [1,292 °F], is used.

This model is mainly used in power plants, plant construction and also the chemical industry. All instruments are fitted with dry wells for large inserts.

## Specifications of the temperature dry-well calibrator

Scale range	CTD9350-700		CTD9350-165	
Temperature range	T <sub>amb</sub> ... 700 °C [T <sub>amb</sub> ... 1,292 °F]		-35 ... +165 °C [-31 ... +329 °F]	
Units	Adjustable via menu <input type="checkbox"/> °C <input type="checkbox"/> °F <input type="checkbox"/> K			
<b>Accuracy</b>				
External reference temperature probe	±0.100 °C [±0.180 °F] <sup>2)</sup>		±0.100 °C [±0.180 °F]	
Internal reference temperature probe	0.075 % of reading, min. ±0.3 °C [0.54 °F]		±0.100 °C [±0.180 °F]	
<b>Temperature stability<sup>1)</sup></b>				
External reference temperature probe	±0.020 °C [±0.036 °F] <sup>2)</sup>		±0.008 °C [±0.014 °F]	
Internal reference temperature probe	±0.100 °C [±0.180 °F]		±0.015 °C [±0.027 °F]	
<b>Influence due to loading<sup>1)</sup></b>				
External reference temperature probe	±0.020 °C [±0.036 °F] <sup>2)</sup>		±0.010 °C [±0.018 °F]	
Internal reference temperature probe	±0.300 °C [±0.540 °F]		±0.300 °C [±0.540 °F]	
<b>Digital display</b>				
Indication range	0 ... 700 °C [32 ... 1,292 °F]		-50 ... +165 °C [-58 ... +329 °F]	
Display resolution	0.001 °C			
Type of display	Bright colour touchscreen (7"), laminated safety glass			
Menu languages	Adjustable via menu <input type="checkbox"/> English <input type="checkbox"/> German			
<b>Temperature distribution<sup>1)</sup></b>				
Axial homogeneity	±0.300 °C [±0.540 °F]		±0.100 °C [±0.180 °F]	
Radial homogeneity	±0.040 °C [±0.072 °F]		±0.020 °C [±0.036 °F]	
<b>Hysteresis</b>	±0.015 °C [±0.027 °F]		±0.010 °C [±0.018 °F]	
<b>Temperature control</b>				
Heating time	19 min	from 20 °C to 690 °C [from 68 °F to 1,274 °F]	14 min	from 20 °C to 165 °C [from 68 °F to 329 °F]
			16 min	from -35 °C to +165 °C [from -31 °F to +329 °F]
Cooling time	85 min	from 700 °C to 30 °C [from 1,292 °F to 86 °F]	13 min	from +20 °C to -30 °C [from +68 °F to -22 °F]
			11 min	from +165 °C to 20 °C [from 329 °F to 68 °F]
Stabilisation time	Dependent on temperature and temperature probe			

1) Determined in accordance with current calibration guideline in a standard insert sleeve.

2) In combination with insert for model CTD9350-700 Air Shield.

Temperature dry-well calibrator	CTD9350-700	CTD9350-165
<b>Metal block</b>		
Insertion depth	150 mm [5.91 in]	150 mm [5.91 in]
Insert dimensions	Ø 29 x 150 mm [1.14 x 5.91 in]	Ø 28 x 150 mm [1.1 x 5.91 in]
Dry-well material	Aluminium-Bronze	Brass
<b>Dimensions (W x D x H)</b>		
Calibrator without carrying handle	210 x 300 x 330 mm [8.27 x 11.81 x 12.99 in]	210 x 300 x 380 mm [8.27 x 11.81 x 14.96 in]
Height of the carrying handle	50 mm [1.97 in]	
<b>Weight</b>	10 kg [22.1 lbs]	Approx. 13.5 kg [29.77 lbs]

Electrical connection	CTD9350-700	CTD9350-165
<b>Operating voltage</b> <sup>1)</sup>	<ul style="list-style-type: none"> <li>■ AC 110 ... 115 V, 60 Hz <sup>2)</sup></li> <li>■ AC 230 V, 50 Hz <sup>2)</sup></li> </ul>	AC 100 ... 240 V, 50/60 Hz
<b>Power consumption</b>	1,000 W	375 W
<b>Electrical safety</b>	Overvoltage category (installation category) II, Pollution degree 2 in accordance with IEC-61010-1	
<b>Fuse</b>	10 AH 250 V slow blow fuse	6.3 AH 250V slow blow fuse
<b>Power cord</b>	AC 230 V; for Europe	

1) AC 115 V supply voltage must be specified on the order, otherwise an AC 230 V one will be delivered.

2) Protective conductor (PE) must be available.

Operating conditions	
<b>Place of use</b>	For indoor use only
<b>Altitude</b>	To 2,000 m [6,562 ft]
<b>Operating temperature</b>	0 ... 50 °C [32 ... 122 °F] The ambient temperature influences the heating/cooling behaviour
<b>Storage and transport temperature range</b>	-10 ... +60 °C [14 ... 140 °F]
<b>Relative humidity, condensation</b>	< 80 % up to 31 °C [88 °F], decreasing linearly down to 50 % at 40 °C [104 °F] (non-condensing)
<b>Mounting position</b>	Upright / vertical standing

Communication	
<b>Interface</b>	<ul style="list-style-type: none"> <li>■ 3 x USB</li> <li>■ Ethernet</li> </ul>
<b>Connectivity</b>	<ul style="list-style-type: none"> <li>■ OPC UA</li> <li>■ Serial communication</li> <li>■ HTTP</li> </ul> Details and further possibilities on request
<b>Baud rate</b>	2400
<b>Measuring rate</b>	1 measured value per second
<b>Internal program</b>	Test items, test tasks and test points can be applied without limit

## Specifications for integrated measuring instrument

Output signal	
<b>Analogue output</b>	
Voltage supply	DC 24 V (can be activated via menu)
Load	Max. 24 mA
<b>Switching function</b>	NC, NO

Electrical connection					
<b>Number of channels</b>					
Resistance thermometer	2				
Thermocouple	2				
Current signal	1				
Voltage signal	1				
Switch test	2				
<b>Connection type</b>					
Resistance thermometer	4 x 4-mm banana jacks				
Thermocouple	2 x thermocouple terminal (mini)				
Current and voltage signal	4 mm banana jacks				
<b>Pin assignment</b>					
Resistance thermometer	<ul style="list-style-type: none"> <li>■ 2-wire connection</li> <li>■ 3-wire connection</li> <li>■ 4-wire connection</li> </ul>				
<b>Measuring range</b>					
Resistance thermometer	<table border="0"> <tr> <td>Pt100</td> <td>0 ... 400 Ω</td> </tr> <tr> <td>Pt1000</td> <td>0 ... 4,000 Ω</td> </tr> </table>	Pt100	0 ... 400 Ω	Pt1000	0 ... 4,000 Ω
Pt100	0 ... 400 Ω				
Pt1000	0 ... 4,000 Ω				
Thermocouple	-10 ... +100 mV				
Current signal	DC 0 ... 24 mA				
Voltage signal	DC 0 ... 12 V				

Accuracies	Measuring range		Accuracy	
<b>Resistance thermometer</b>				
Pt100	-200 ... +850 °C	[-328 ... +1,562 °F]	±0.03 °C	[±0.05 °F]
Pt500	-200 ... +850 °C	[-328 ... +1,562 °F]	±0.12 °C	[±0.22 °F]
Pt1000	-200 ... +850 °C	[-328 ... +1,562 °F]	±0.06 °C	[±0.11 °F]
Ni100	-60 ... +180 °C	[-76 ... +356 °F]	±0.02 °C	[±0.04 °F]
Ni500	-60 ... +200 °C	[-76 ... +392 °F]	±0.08 °C	[±0.14 °F]
Ni1000	-60 ... +200 °C	[-76 ... +392 °F]	±0.04 °C	[±0.07 °F]
<b>Cold junction</b>	-200 ... +1,820 °C	[-328 ... +3,308 °F]	±0.3 °C	[±0.54 °F]
<b>Thermocouple</b>				
Type K	-160 ... +1,260 °C	[-256 ... +2,300 °F]	±0.08 °C	[±0.14 °F]
Type J	-190 ... +1,200 °C	[-310 ... +2,192 °F]	±0.07 °C	[±0.13 °F]
Type N	0 ... 1,300 °C	[32 ... 2,372 °F]	±0.13 °C	[±0.23 °F]
Type E	-200 ... +1,000 °C	[-328 ... +1,832 °F]	±0.06 °C	[±0.11 °F]
Type T	-130 ... +400 °C	[-202 ... +752 °F]	±0.09 °C	[±0.16 °F]
Type R	160 ... 1,760 °C	[320 ... 3,200 °F]	±0.78 °C	[±1.40 °F]
Type S	170 ... 1,760 °C	[338 ... 3,200 °F]	±0.73 °C	[±1.31 °F]
Type B	920 ... 1,820 °C	[1,688 ... 3,308 °F]	±0.5 °C	[±0.90 °F]

Accuracies	Measuring range	Accuracy
Direct current	0 ... 24 mA	0.01 % of end value
DC voltage	0 ... 12 V	0.01 % of end value

## Approvals

Logo	Description	Region
CE	<b>EU declaration of conformity</b>	European Union
	EMC directive EN 61326 emission (group 1, class A) and immunity (industrial application)	
	Low voltage directive EN 61010, safety requirements for electrical equipment for measurement, control and laboratory use	
	RoHS directive	
UK CA	<b>UKCA</b>	United Kingdom
	Electromagnetic compatibility regulations	
	Electrical equipment designed for use within certain voltage limits in support of the electrical equipment (safety) regulations	
	Restriction of hazardous substances (RoHS) regulations	

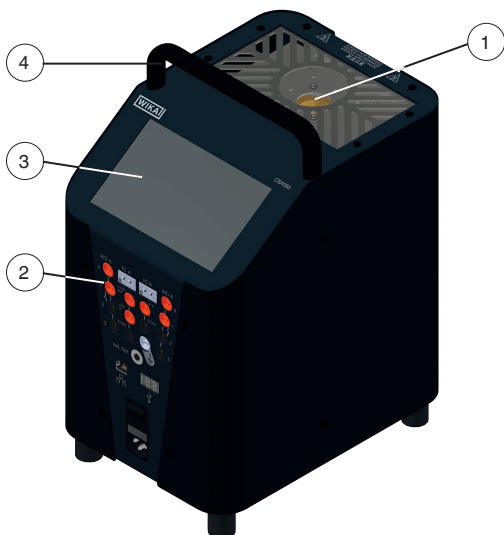
## Certificates

Certificates	
<b>Calibration</b>	
Integrated measuring instrument	<ul style="list-style-type: none"> <li>■ Without</li> <li>■ 3.1 inspection certificate per EN 10204 for PT, TC, mA and V</li> <li>■ DAkkS calibration certificate for PT, TC, mA and V</li> </ul>
Reference thermometer	<ul style="list-style-type: none"> <li>■ Without</li> <li>■ 3.1 inspection certificate per EN 10204 up to a maximum of 165 °C [329 °F]</li> <li>■ DAkkS calibration certificate up to a maximum of 165 °C [329 °F]</li> <li>■ 3.1 inspection certificate per EN 10204 for the range <math>T_{amb} \dots 700 \text{ °C}</math> [<math>T_{amb} \dots 1,292 \text{ °F}</math>]</li> <li>■ DAkkS calibration certificate for the range <math>T_{amb} \dots 700 \text{ °C}</math> [<math>T_{amb} \dots 1,292 \text{ °F}</math>]</li> </ul>
Calibrator <sup>1)</sup>	<ul style="list-style-type: none"> <li>■ 3.1 inspection certificate per EN 10204 (factory calibration)</li> <li>■ DAkkS calibration certificate (traceable and accredited in accordance with ISO/IEC 17025)</li> </ul>
<b>Recommended calibration interval</b>	1 year (dependent on conditions of use)

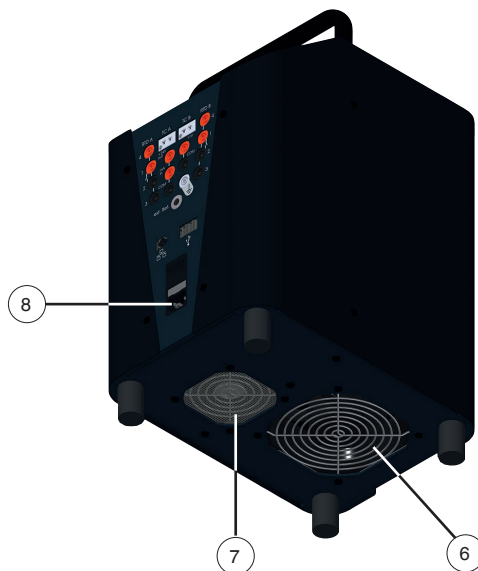
1) Calibration is carried out, as standard, at 6 temperatures evenly distributed over the temperature range. On request, special points are also possible.

→ For approvals and certificates, see website

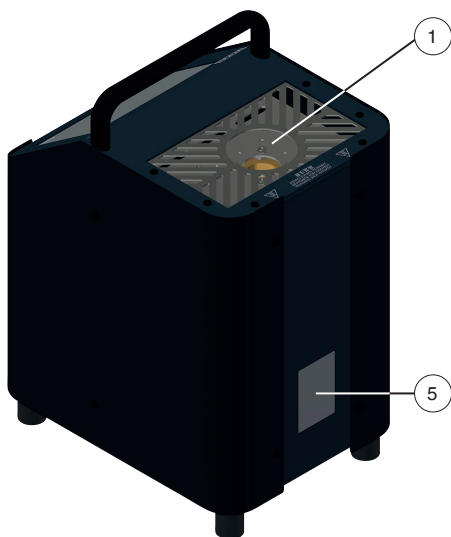
## Isometric views



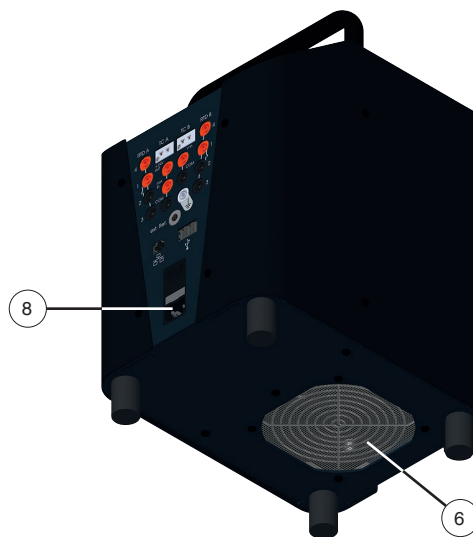
Front view



Bottom view model CTD9350-165



Rear view



Bottom view model CTD9350-700

- ① Temperature dry well
- ② Integrated measuring instrument
- ③ Digital display/Touchscreen
- ④ Carrying handle
- ⑤ Product label

- ⑥ Fan 1
- ⑦ Fan 2
- ⑧ Mains connector socket with main switch

## Additional features of the CTD9350

### Easy calibration, with automatic certificate generation

The operation of the instruments using the large touchscreen is very simple and intuitive. The calibrator's software makes it easy to create calibration tasks to simplify the calibration process for the user as much as possible. With this, automatic calibrations can be performed after adding a test item and the desired measuring points. The measured value can be recorded with the integrated measuring instrument, manually or with an optional USB camera. At the end of the process, the instrument's own software creates a calibration certificate.


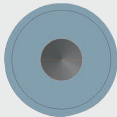
### Increase productivity!

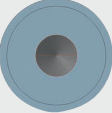

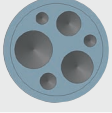

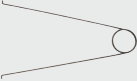
Since, in a large number of processes, the time factor is important, an actual time calculation is carried out and the change time is displayed each time the temperature values change. This gives the user a better overview of their heating and cooling times.

### Stable, homogeneous dry-well temperature

Due to a controller, which has been specifically developed for temperature calibration, and a special heating block for temperatures up to 700 °C [1,292 °F], a high control accuracy and a homogeneous temperature distribution within the block is achieved. Important features in this context are control algorithms, which have been optimised for the calibration processes, and a heating block with a heating power that increases towards the upper end. The small resulting temperature fluctuations and the good axial temperature distribution lead to a considerably reduced total measurement uncertainty during calibration.

## Accessories

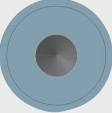



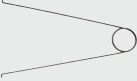
Inserts for model CTD9350-165 <sup>1)</sup>		Order code
Description		CTA9I-3R
	<b>Undrilled insert</b> Ø 28 x 150 mm [Ø 1.1 x 5.91 in] Material: Brass 2.0375	-N-
	<b>Drilled insert</b> Ø 28 x 150 mm [Ø 1.1 x 5.91 in] Drilling depth: 145 mm [5.71 in] Material: Brass 2.0375	-
	For thermometers with diameters up to 1.2 mm [0.05 in] Bore diameter: 1 x 1.5 mm [1 x 0.06 in]	-1-
	For thermometers with diameters up to 1.6 mm [0.06 in] Bore diameter: 1 x 2 mm [1 x 0.08 in]	-2-
	For thermometers with diameters up to 2.7 mm [0.11 in] Bore diameter: 1 x 3 mm [1 x 0.12 in]	-3-
	For thermometers with diameters up to 3.2 mm [0.13 in] Bore diameter: 1 x 3.5 mm [1 x 0.14 in]	-4-
	For thermometers with diameters up to 4.7 mm [0.19 in] Bore diameter: 1 x 5 mm [1 x 0.20 in]	-5-
	For thermometers with diameters up to 6.3 mm [0.25 in] Bore diameter: 1 x 6.5 mm [1 x 0.26 in]	-6-

Inserts for model CTD9350-165 <sup>1)</sup>		Order code
Description		CTA9I-3R
	For thermometers with diameters up to 7.2 mm [0.28 in] Bore diameter: 1 x 7.5 mm [1 x 0.30 in]	-7-
	For thermometers with diameters up to 8.2 mm [0.32 in] Bore diameter: 1 x 8.5 mm [1 x 0.33 in]	-8-
	For thermometers with diameters up to 9.5 mm [0.37 in] Bore diameter: 1 x 10 mm [1 x 0.39 in]	-9-
	Bore diameter: 1 x 3.2 mm and 1 x 6.3 mm [1 x 0.13 in and 1 x 0.25 in]	-A-
	Bore diameter: 2 x 3.2 mm, 1 x 4.2 mm, 1 x 6.3 mm, 1 x 8.4 mm and 1 x 9.9 mm [2 x 0.13 in, 1 x 0.17 in, 1 x 0.25 in, 1 x 0.33 in and 1 x 0.39 in]	-B-
	Customer-specific, special probes are possible on request.	-I-
	<b>Insert replacement tool</b>	-J-
<b>Ordering information for your enquiry:</b>		
1. Order code: CTA9I-3R		↓
2. Option:		[ - ]




1) The figures are an example and may change depending on the state of the art in design, material composition and representation

Inserts for model CTD9350-700 <sup>1)</sup>		Order code
Description		CTA9I-3S
	<b>Undrilled insert</b> Ø 29 x 150 mm [Ø 1.14 x 5.91 in] Material: Aluminium-Bronze 2.0966	-N-
	<b>Drilled insert</b> Ø 29 x 150 mm [Ø 1.14 x 5.91 in] Drilling depth: 145 mm [5.71 in] Material: Aluminium-Bronze 2.0966	
	For thermometers with diameters up to 1.2 mm [0.05 in] Bore diameter: 1 x 1.5 mm [1 x 0.06 in]	-1-
	For thermometers with diameters up to 1.6 mm [0.06 in] Bore diameter: 1 x 2 mm [1 x 0.08 in]	-2-
	For thermometers with diameters up to 2.7 mm [0.11 in] Bore diameter: 1 x 3 mm [1 x 0.12 in]	-3-
	For thermometers with diameters up to 3.2 mm [0.13 in] Bore diameter: 1 x 3.5 mm [1 x 0.14 in]	-4-

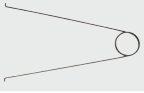


Inserts for model CTD9350-700 <sup>1)</sup>		Order code
Description		CTA9I-3S
	For thermometers with diameters up to 4.7 mm [0.19 in] Bore diameter: 1 x 5 mm [1 x 0.20 in]	-5-
	For thermometers with diameters up to 6.3 mm [0.25 in] Bore diameter: 1 x 6.5 mm [1 x 0.26 in]	-6-
	For thermometers with diameters up to 7.2 mm [0.28 in] Bore diameter: 1 x 7.5 mm [1 x 0.30 in]	-7-
	For thermometers with diameters up to 8.2 mm [0.32 in] Bore diameter: 1 x 8.5 mm [1 x 0.33 in]	-8-
	For thermometers with diameters up to 9.5 mm [0.37 in] Bore diameter: 1 x 10 mm [1 x 0.39 in]	-9-
	Bore diameter: 1 x 3.2 mm and 1 x 6.3 mm [1 x 0.13 in and 1 x 0.25 in]	-A-
	Bore diameter: 2 x 3.2 mm, 1 x 4.2 mm, 1 x 6.3 mm, 1 x 8.4 mm and 1 x 9.9 mm [2 x 0.13 in, 1 x 0.17 in, 1 x 0.25 in, 1 x 0.33 in and 1 x 0.39 in]	-B-
	Customer-specific, special probes are possible on request.	-I-
	<b>Insert replacement tool</b>	-J-
<b>Ordering information for your enquiry:</b>		
1. Order code: CTA9I-3S		↓
2. Option:		[ ]

1) The figures are an example and may change depending on the state of the art in design, material composition and representation

Inserts for model CTD9350-700, Air Shield <sup>1)</sup>		Order code
Description		CTA9I-3T
	<b>Undrilled insert</b> Ø 29 x 150 mm [Ø 1.14 x 5.91 in] Material: Aluminium-Bronze 2.0966	-N-
	For thermometers with diameters up to 3.2 mm [0.13 in] Bore diameter: 1 x 5 mm and 1 x 3.5 mm [1 x 0.2 in and 1 x 0.14 in]	-I-
	For thermometers with diameters up to 6.3 mm [0.25 in] Bore diameter: 1 x 5 mm and 1 x 6.5 mm [1 x 0.2 in and 1 x 0.26 in]	-X-
	Customer-specific, special probes are possible on request.	-I-



Inserts for model CTD9350-700, Air Shield <sup>1)</sup>		Order code
Description		CTA9I-3T
	Insert replacement tool	-J-
<b>Ordering information for your enquiry:</b>		
1. Order code: CTA9I-3T 2. Option:		↓ [ ]

- 1) The figures are an example and may change depending on the state of the art in design, material composition and representation  
2) Only carry out the calibration with an external reference!

## Scope of delivery

- Temperature dry-well calibrator  
model CTD9350-165, CTD9350-700 or CTD9350-700  
Air Shield
- Power cord, 1.5 m [5 ft] with safety plug
- Insert replacement tools
- PC and network cable
- USB stick with backup function
- Protective packaging / Transport protection
- Operating instructions
- Calibration certificate

## Ordering information

Model / Temperature range / Integrated measuring instrument / Reference thermometer / Calibration / Transport case / Power cord / Insert / Further approvals / Additional ordering information

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